Stoller
Grand Junction Office established 1959

299-E33-XX (B8827)
Log Data Report

Borehole Information:

Borehole: 299-E33-XX (B8827)			**Site:** 216-B-63 Ditch		
Coordinates (WA State Plane)		**GWL (ft)[1]:** Not reached		**GWL Date:**	3/25/2003
North	**East**	**Drill Date**	**TOC[2] Elevation**	**Total Depth (ft)**	**Type**
n/a[3]	n/a	March 2003	n/a	103	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	2.6	10 3/4	9 5/16	0.72	0	99.6
The driller provided the casing diameter and depths. The stick up was measured.						

Borehole Notes:

Zero reference is the ground surface. This borehole was logged through the drill pipe. The borehole is located near the 216-B-63 Ditch. Depth to bottom and depth to water were measured by the well site geologist. Three feet of crushed gravel were placed over the backfill to build a pad for the drill rig. Approximately 3 ft of open hole is present below the casing.

Logging Equipment Information:

Logging System:	Gamma 2E		**Type:** 70% HPGe
Calibration Date:	03/2003	**Calibration Reference:**	GJO-2003-430-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Logging System:	Gamma 2F		**Type:** Moisture (H380932510)
Calibration Date:	10/2002	**Calibration Reference:**	GJO-2002-387-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	**1**	**2/Repeat**			
Date	3/26/03	3/26/03			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	101.0	11.0			
Finish Depth (ft)	0.0	3.0			
Count Time (sec)	100	100			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	1.0	0.5			
ft/min	N/A[4]	N/A			

Log Run	1	2/Repeat			
Pre-Verification	BE007CAB	BE007CAB			
Start File	BE007000	BE007102			
Finish File	BE007101	BE007118			
Post-Verification	BE007CAA	BE007CAA			
Depth Return Error (in.)	0.5 high	0.0			
Comments	No fine-gain adjustments.	Changed to 0.5' sample interval to characterize zone of ^{137}Cs.			

Neutron-Moisture Logging System (NMLS) Log Run Information:

Log Run	1	2/Repeat		
Date	3/26/03	3/26/03		
Logging Engineer	Pearson	Pearson		
Start Depth (ft)	0.0	5.0		
Finish Depth (ft)	101.25	15.0		
Count Time (sec)	N/A	N/A		
Live/Real	N/A	N/A		
Shield (Y/N)	N/A	N/A		
MSA Interval (ft)	0.25	0.25		
ft/min	1.0	1.0		
Pre-Verification	BF038CAB	BF038CAB		
Start File	BF038000	BF038405		
Finish File	BF038404	BF038444		
Post-Verification	BF038CAA	BF038CAA		
Depth Return Error (in.)	N/A	1.0 high		
Comments	No fine-gain adjustments.			

Logging Operation Notes:

Zero reference was the ground surface, and the borehole was logged through drill pipe. Logging was performed with a centralizer installed on the sonde.

SGLS data were collected using Gamma 2E. Pre- and post-survey verification measurements employed the Amersham KUT (^{40}K, ^{238}U, and ^{232}Th) verifier with serial number 082.

Analysis Notes:

Analyst:	Sobczyk	**Date:**	3/31/03	**Reference:**	GJO-HGLP 1.6.3, Rev. 0

SGLS pre-run and post-run verification spectra were collected at the beginning and end of the day and compared to the control limits. The verification spectra were all within the control limits. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectra as compared to the pre-run verification spectra for each day were between 0.5 percent higher and 1.5 percent lower at the end of the day.

NMLS pre-run and post-run verification spectra were collected at the beginning and end of the day and compared to the control limits established on 12/05/2002. The verification spectra were slightly above the

control limits. The post-run verification spectrum registered 748 cps versus 736 cps in the pre-run verification spectrum.

SGLS log spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G2EMar03.xls), using parameters determined from analysis of recent calibration data. Zero reference was the ground surface. On the basis of measurements supplied by the driller, the casing configuration was assumed to be one string of 10-in. casing to 99.6 ft and open hole below 99.6 ft. The casing correction factor was calculated using a 10-in. casing thickness of 0.72 in. Dead time and water corrections were not needed or applied to the data.

NMLS log spectra were processed in batch mode using APTEC SUPERVISOR to determine count rates. Zero reference was the ground surface. Calibration data are available only for 6-in. and 8-in. casings, and the volume fraction of water was not calculated.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, gross gamma and neutron total counts, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it is less affected by the presence of radon in the borehole.

Results and Interpretations:

^{137}Cs was the only man-made radionuclide detected in this borehole. ^{137}Cs was detected near the ground surface (4 ft through 11 ft) at concentrations ranging from 0.5 to 22.4 pCi/g. The maximum concentration was measured at 9 ft. ^{137}Cs was detected at 43 and 101 ft with concentrations near its MDL of approximately 0.2 pCi/g. After examination of the spectra at these two depths, it was determined that there is no evidence of a photopeak at 662 keV. These reported occurrences are probably the result of statistical fluctuation.

Between 99 ft and 42 ft during log run 1, ^{238}U (609 keV) concentrations are about 0.5 pCi/g higher than those based on the 1764-keV photopeak. This behavior suggests that radon may be present inside the borehole casing. The effects of radon on borehole logging are described in GJO-HGLP 1.6.3, Rev. 0.

The presence of radon is not an indication of man-made contamination; it is derived from decay of naturally occurring uranium. As a gas, radon moves easily in the subsurface, and concentrations of radon and its associated progeny can change quickly.

Recognizable changes in the KUT and total gamma logs occurred in this borehole. At 31 ft, there is a 5-pCi/g increase in ^{40}K concentration. This increase in apparent ^{40}K concentration corresponds with the transition from the Hanford H1 to the Hanford H2.

The plots of the repeat logs demonstrate good repeatability of the SGLS and NMLS data. The man-made and natural radionuclides at energy levels of 662, 609, 1461, 1764, and 2614 keV are comparable between the repeat and original SGLS log runs. The total neutron counts per second and its repeat are within the acceptance criteria.

[1] GWL – groundwater level
[2] TOC – top of casing
[3] n/a – not available
[4] N/A – not applicable

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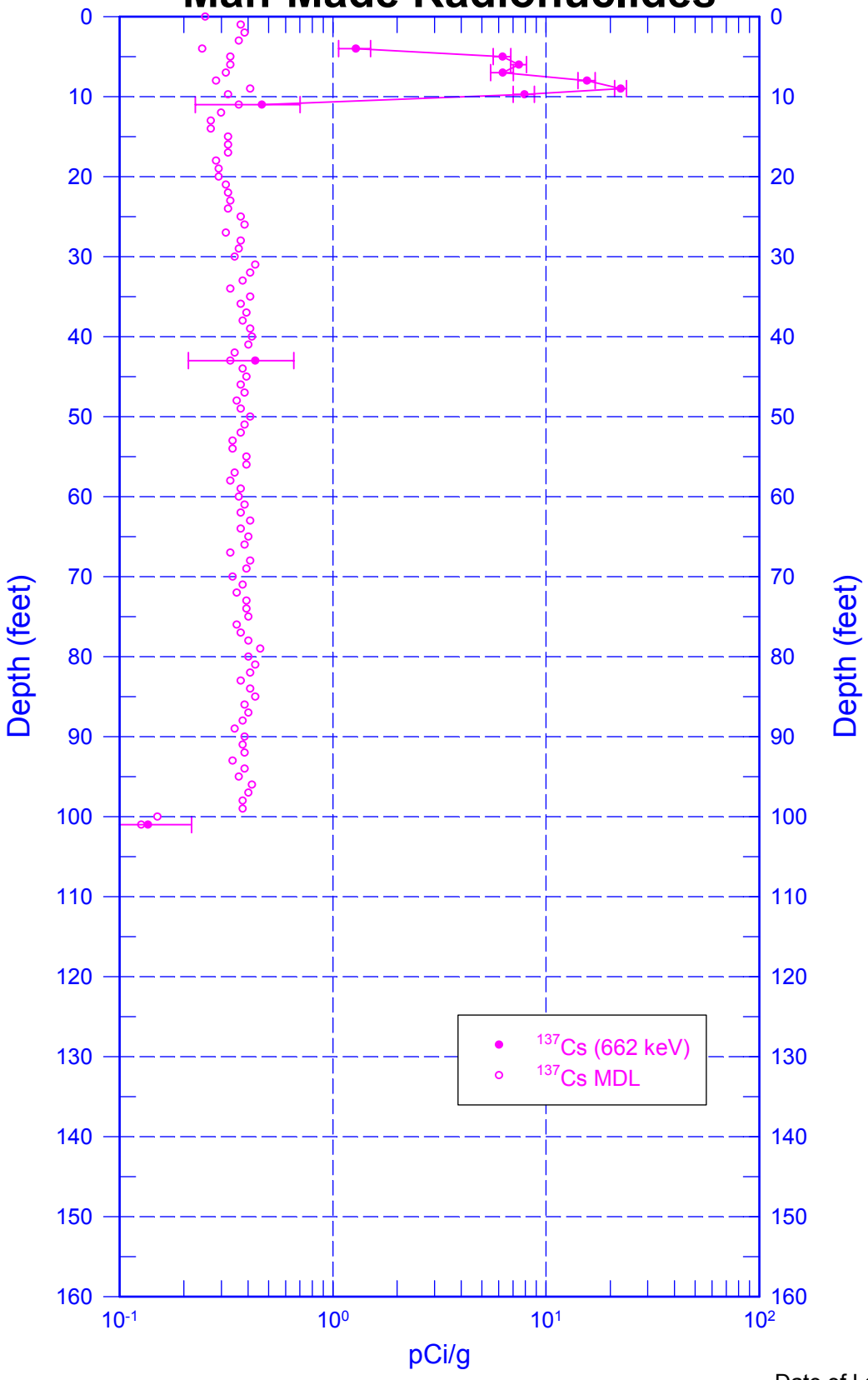
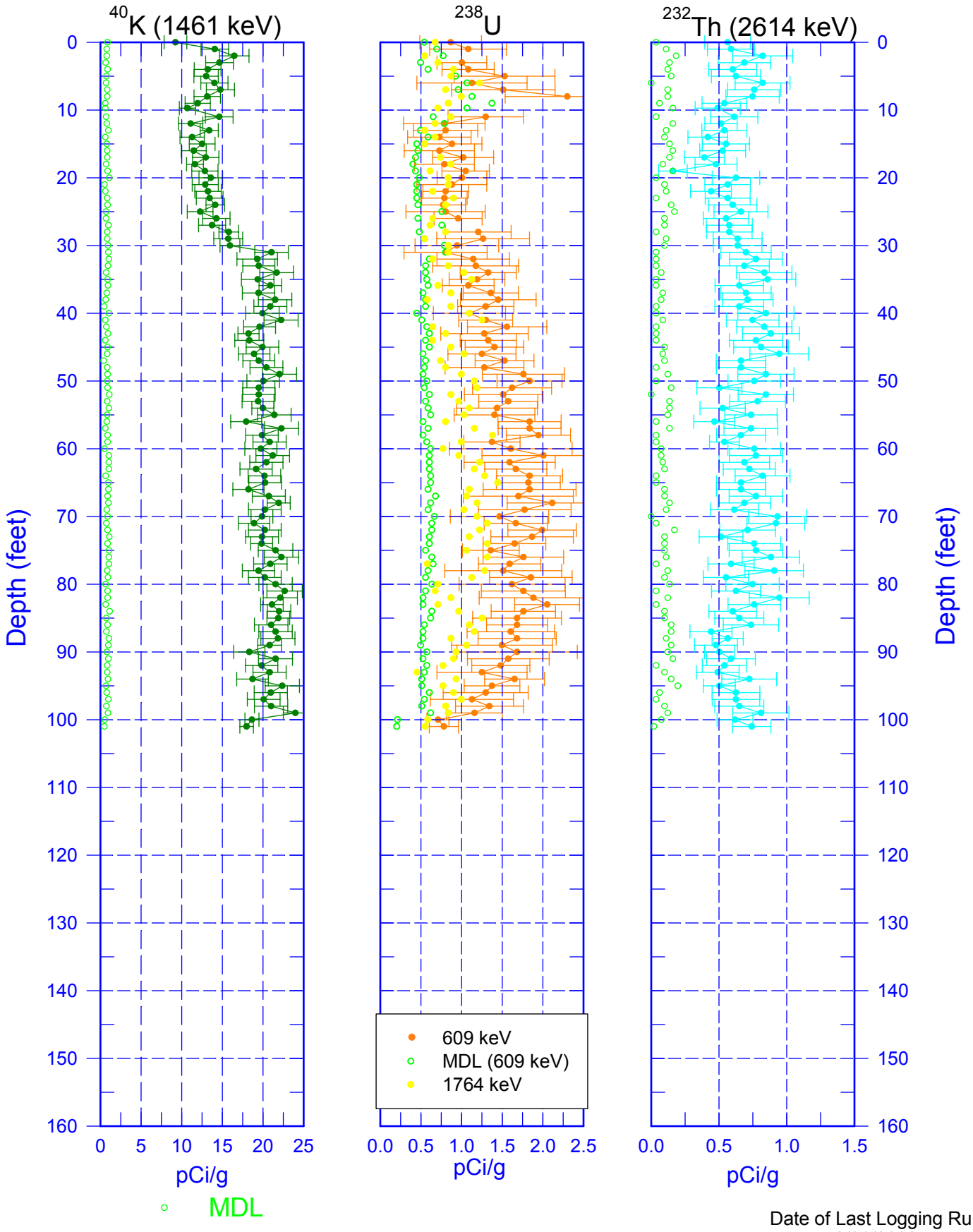
Man-Made Radionuclides



Zero Reference = Ground Surface

Date of Last Logging Run
3/26/2003

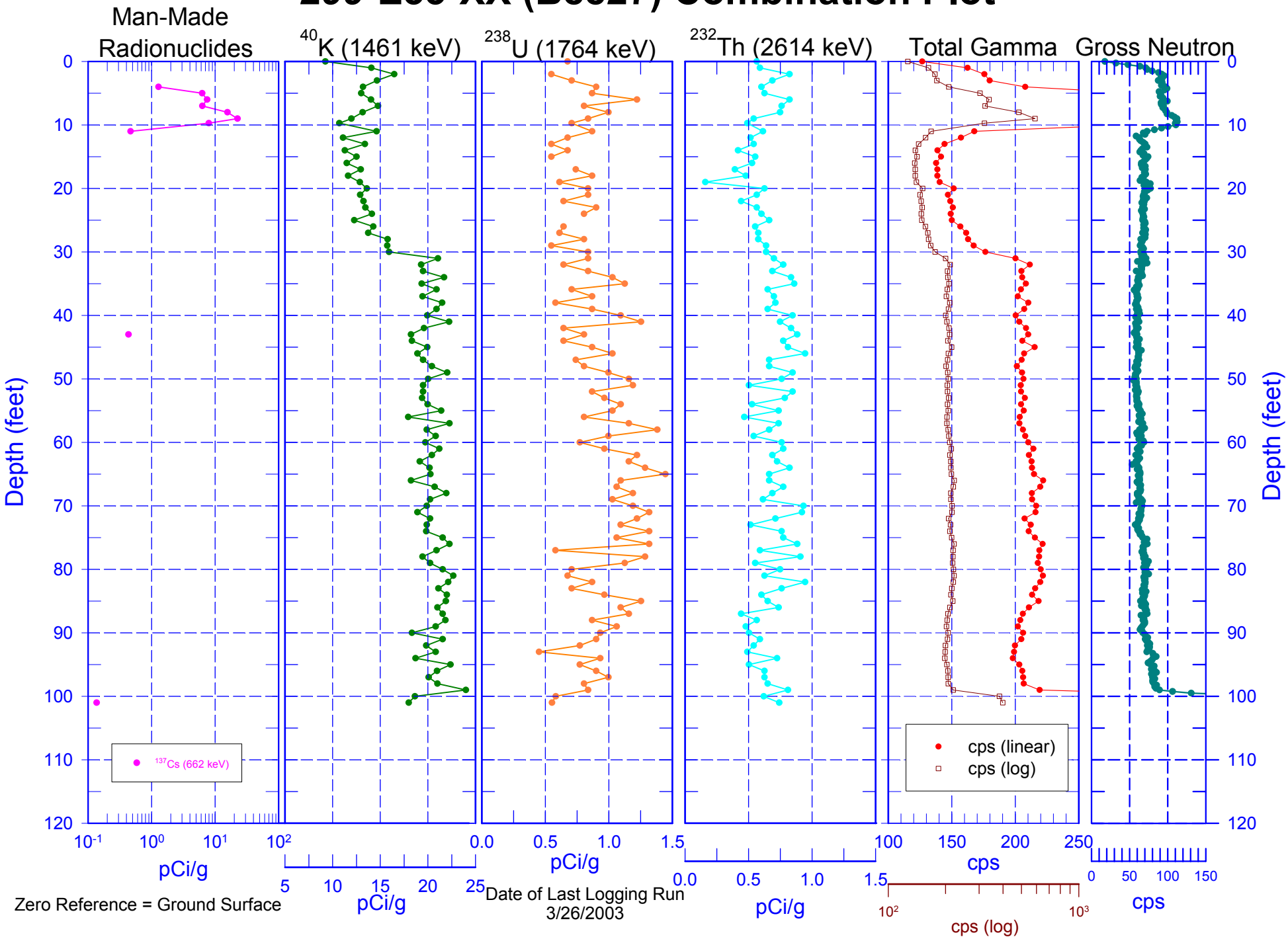
299-E33-XX (B8827)
Natural Gamma Logs



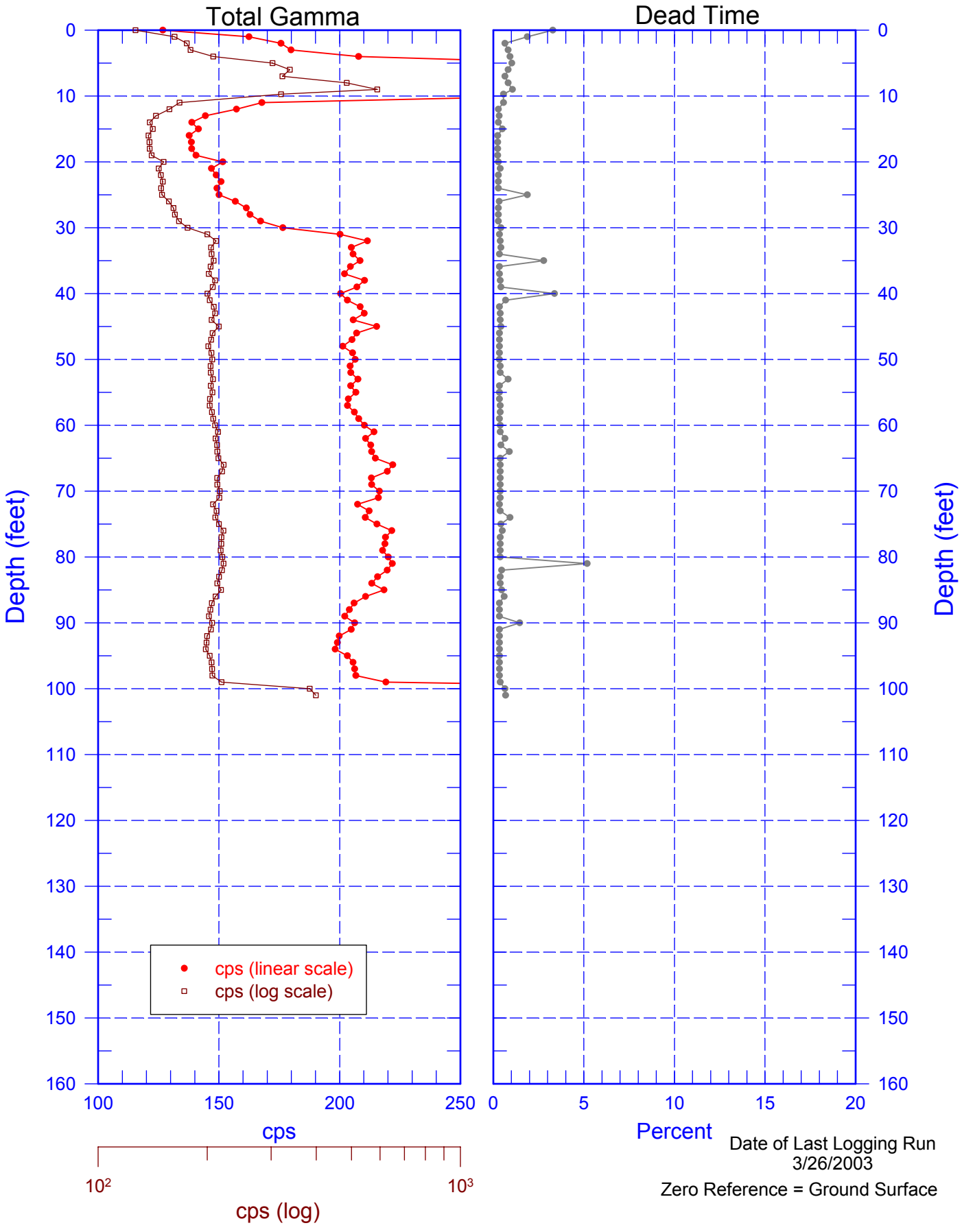
Zero Reference = Ground Surface

Date of Last Logging Run
3/26/2003

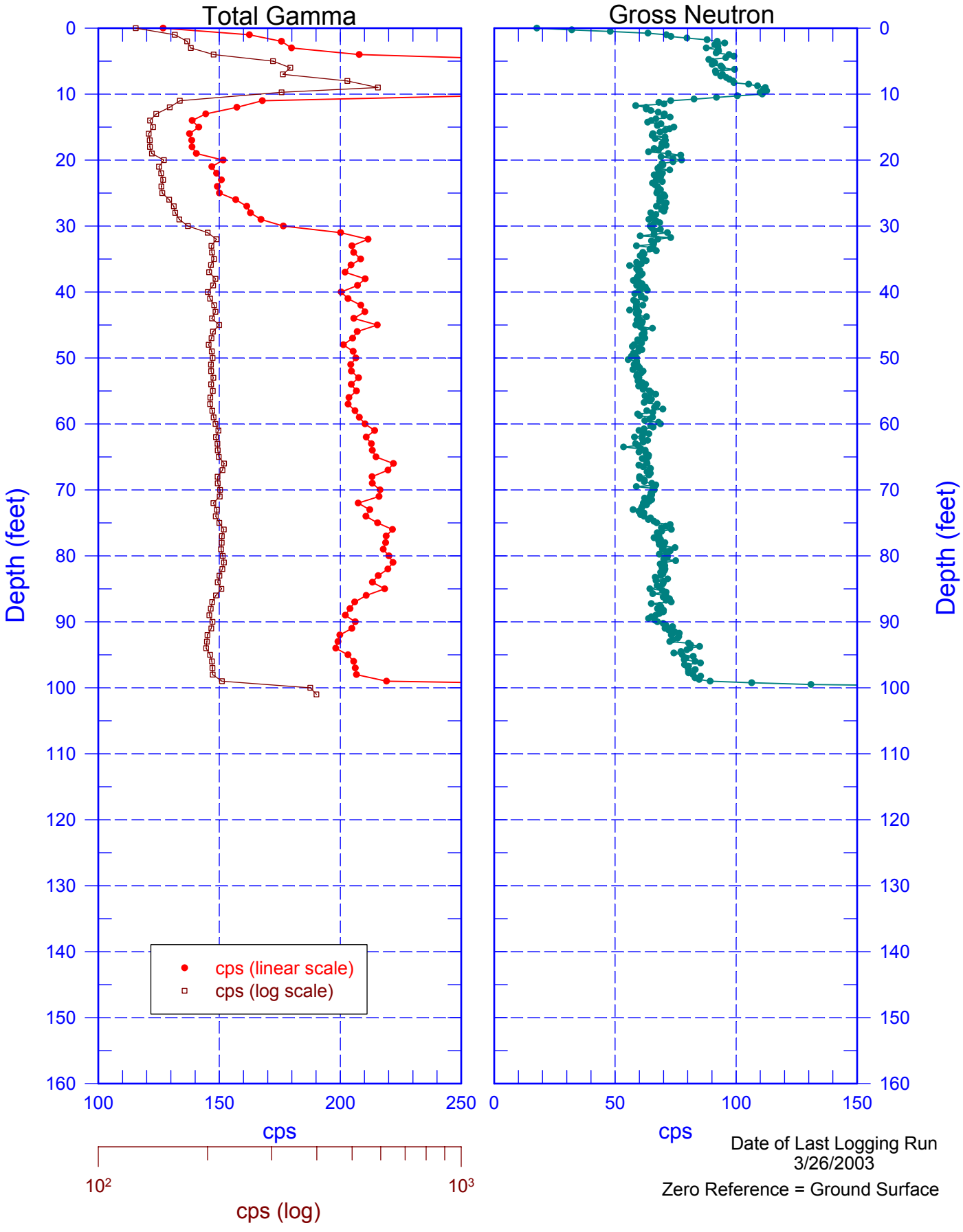
299-E33-XX (B8827) Combination Plot



299-E33-XX (B8827)
Total Gamma & Dead Time



299-E33-XX (B8827)
Total Gamma & Neutron



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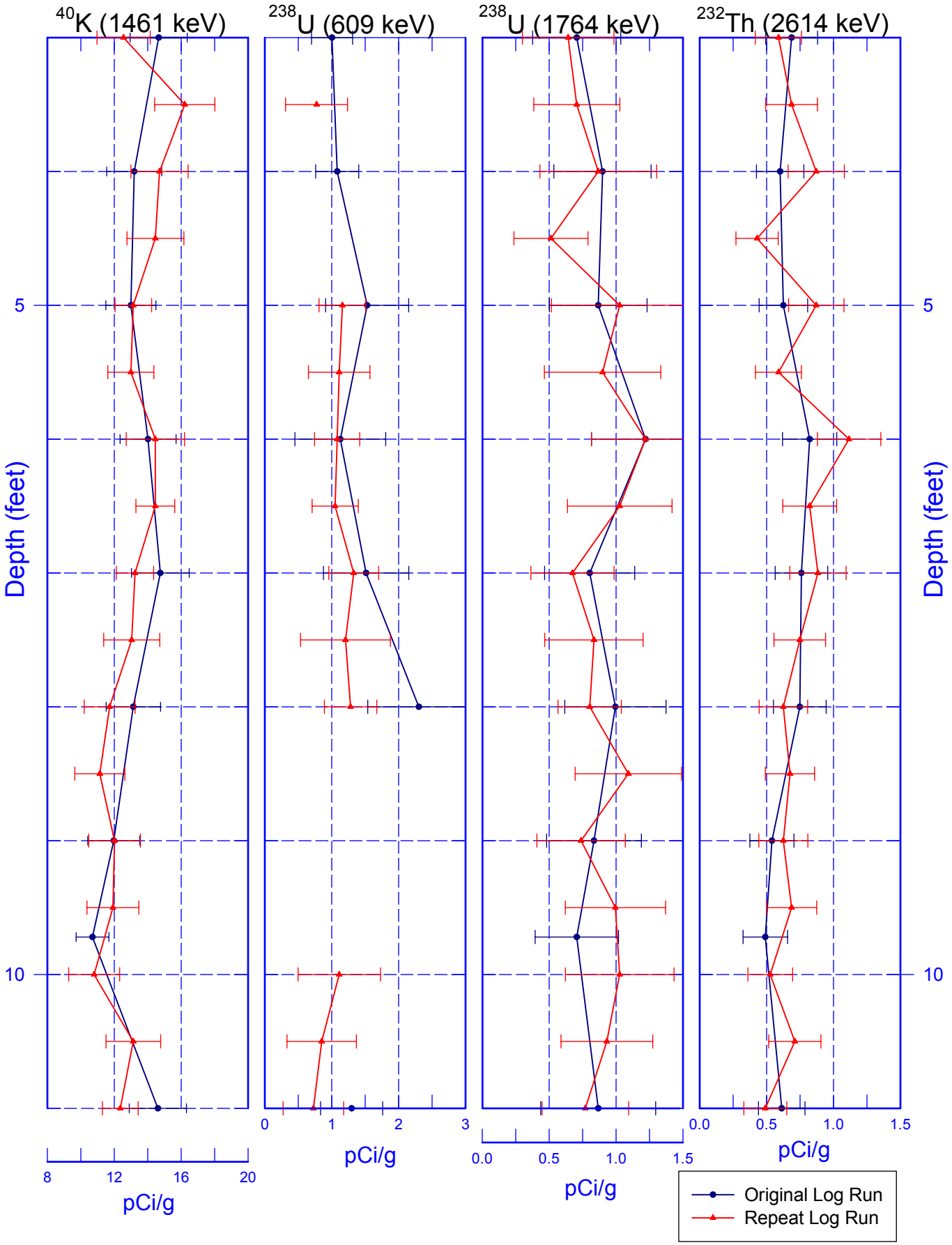
Rerun of Natural Gamma Logs (11.0 to 3.0 ft)



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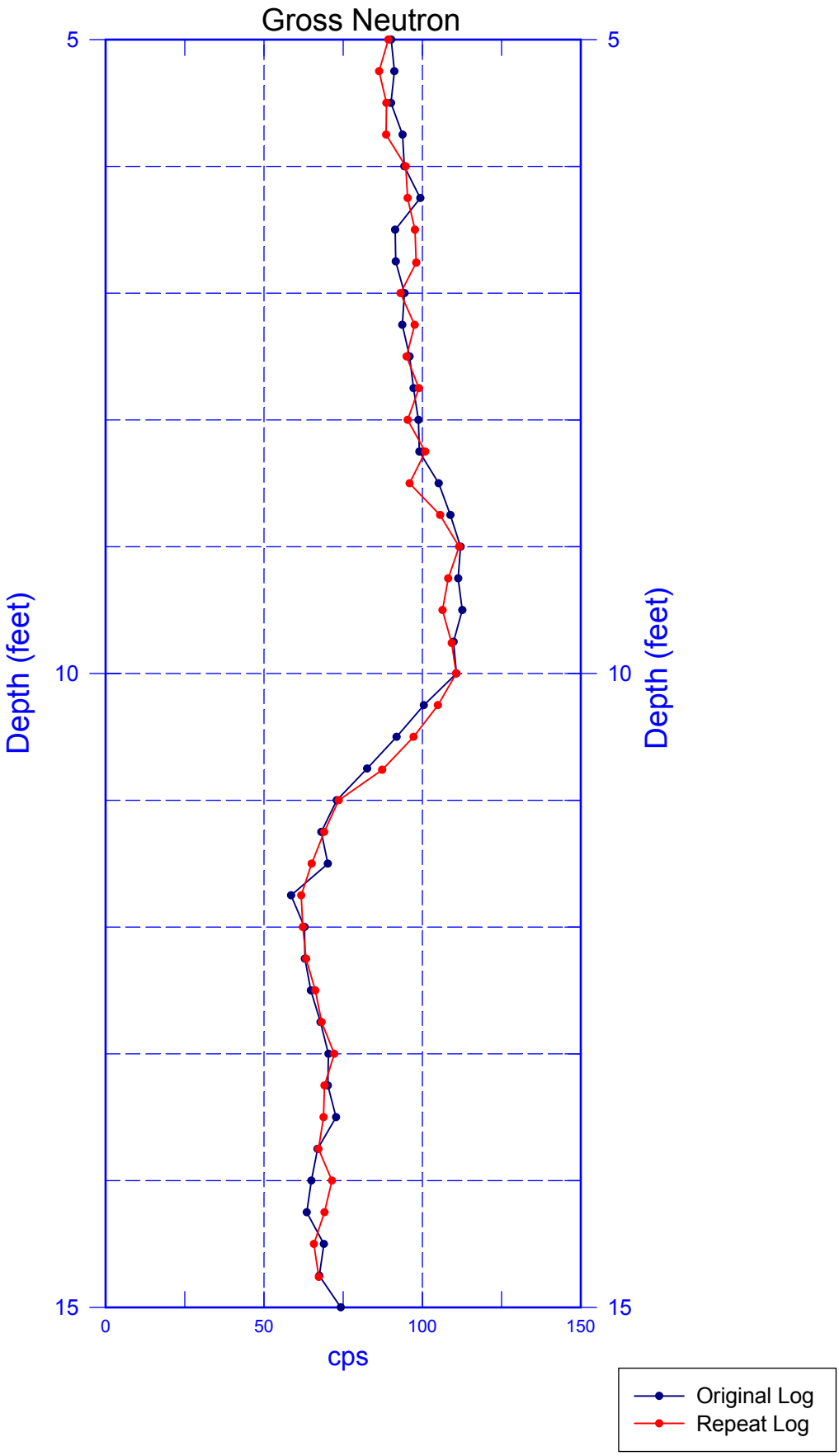
Rerun of Neutron-Moisture Log (5.0 to 15.0 ft)



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Rerun of Man-Made Radionuclides (11.0 to 3.0 ft)